

WHAT IS CLAIMED IS:

1. A nonreciprocal circuit device comprising:
a center electrode assembly including a ferrite, a plurality of center electrodes and a plurality of insulating films defining a multilayer structure provided on a surface of the ferrite, and a plurality of side electrodes provided on side surfaces of the ferrite; wherein
each end portion of each of the plurality of center electrodes provided on the surface of the ferrite has a thickness greater than the thickness of the other portions of each of the plurality of center electrodes, and each thicker end portion of each of the plurality of center electrodes is connected to a corresponding side electrode.
2. The nonreciprocal circuit device according to claim 1, wherein each thicker end portion of each of the plurality of center electrodes is made of a conductive material filled in a corresponding one of a plurality of openings provided in peripheral portions of the insulating films.
3. The nonreciprocal circuit device according to claim 2, wherein the thickness of each end portion of the center electrode in a bottom layer of the multilayer structure on the surface of the ferrite is increased by a conductive material filled in a corresponding one of the plurality of openings formed in the insulating films on an upper surface of the end portion.
4. The nonreciprocal circuit device according to claim 3, wherein the thickness of each end portion of the plurality of center electrodes in a top layer of the multilayer structure on the surface of the ferrite is increased by a conductive material filled in a corresponding one of the plurality of openings formed in the insulating films on a lower surface of the end portion.
5. The nonreciprocal circuit device according to claim 1, wherein the center electrodes are made of a photosensitive conducting material.

6. The nonreciprocal circuit device according to claim 1, wherein the insulating films are made of a photosensitive insulating material.
7. The nonreciprocal circuit device according to claim 1, further comprising a metal case including a lower metal case and an upper metal case, said lower metal case having a bottom portion and right and left side portions, and said upper case having a top portion and four side portions.
8. The nonreciprocal circuit device according to claim 1, wherein each of said thicker end portions has a thickness of about 40 μm .
9. The nonreciprocal circuit device according to claim 1, wherein said multilayer structure further comprises at least one shrinkage prevention sheet provided on at least one of an upper surface and a lower surface of the multilayer structure.
10. The nonreciprocal circuit device according to claim 1, wherein each of said plurality of center electrodes is made of a material selected from the group consisting of Ag, Cu and Ag-Pd.
11. The nonreciprocal circuit device according to claim 1, wherein the ferrite is a microwave ferrite.
12. A communication device including a nonreciprocal circuit device according to claim 1.
13. A method of manufacturing a center electrode assembly of nonreciprocal circuit devices comprising the steps of:
alternately forming a center electrode and an insulating film on a surface of a ferrite mother substrate so as to form a multilayer structure in which a plurality of said center electrodes are insulated from one another by a respective one of a plurality of the insulating films;

forming an opening in each of the plurality of insulating films where end portions of respective ones of the plurality of center electrodes are located;

filling each of the openings with an electrode material to form filled-in electrodes to be electrically connected to a respective one of the plurality of center electrodes; and

cutting the ferrite mother substrate into individual center electrode assemblies; wherein

each end portion of each of the plurality of center electrodes provided on the surface of the ferrite mother substrate has a thickness greater than the thickness of the other portions of each of the plurality of center electrodes, and each thicker end portion of each of the plurality of center electrodes is connected to a corresponding filled-in electrode.

14. A method according to claim 13, wherein the plurality of center electrodes are formed by printing a photosensitive thick film, exposing the photosensitive thick film with an ultraviolet ray via a photomask pattern, and spraying an alkaline solution such that non-exposed portion of the photosensitive thick film are etched to thereby form the plurality of center electrodes.

15. The method according to claim 13, wherein said step of cutting includes the step of cutting the ferrite mother substrate at a location of the center of the filled-in electrodes so as to form side electrodes on at least one side surface of each of the individual center electrode assemblies.

16. The method according to claim 13, wherein each of said thick end portions has a thickness of about 40 μm .

17. The method according to claim 13, further comprising the step of forming a shrinkage prevention sheet on the ferrite mother substrate.